

Graham, Benita

From: Nelson, Mark
Sent: Tuesday, February 02, 2016 12:22 PM
To: Branby, Jill
Subject: FW: Article on HRSD SWR Initiative

From: Johnson, KarenD
Sent: Tuesday, February 02, 2016 12:21 PM
To: Poe, Brian <poe.brian@epa.gov>; Nelson, Mark <Nelson.Mark@epa.gov>
Subject: Fwd: Article on HRSD SWR Initiative

Sent from my iPhone

Begin forwarded message:

From: "Zolandz, Mark" <Zolandz.Mark@epa.gov>
Date: February 2, 2016 at 10:30:50 AM EST
To: "Bartlett, Deane" <Bartlett.Deane@epa.gov>, Nancy Flickinger <Nancy.Flickinger@usdoj.gov>, "Bufill, Lourdes" <Bufill.Lourdes@epa.gov>, "McGuigan, David" <McGuigan.David@epa.gov>, "Capacasa, Jon" <Capacasa.jon@epa.gov>, "rogers, rick" <rogers.rick@epa.gov>, "Johnson, KarenD" <Johnson.KarenD@epa.gov>
Subject: Article on HRSD SWR Initiative

http://pilotonline.com/news/local/environment/could-your-sinks-and-toilets-fight-sea-level-rise-in/article_df55a0e1-6992-54b0-b2c3-94a26402a89c.html

Could your sinks and toilets fight sea-level rise in Hampton Roads?

- By Dave Mayfield
The Virginian-Pilot

On a clear December morning, a roaring stream rushed from the Hampton Roads Sanitation District's Suffolk treatment plant. Hundreds of thousands of sinks, showers and toilets had fed the torrent, now headed for the James River.

Looking down at the cascade, Ted Henifin tried to recall when he got the idea that maybe, just maybe, all that water needn't go to waste.

"I remember sending an email to our planning guy, saying, 'Can we figure out how to do this?' " said Henifin, HRSD's general manager.

That message a couple of years ago marked the humble beginning of what's shaping up as one of the boldest public works proposals in recent Virginia history.

What Henifin has in mind is turning the treated wastewater into something useful. He wants to make it so clean that you and I could safely drink it, and then he wants to inject it more than a thousand feet underground into an aquifer that's being rapidly depleted.

In doing so, he hopes to address a bunch of problems vexing coastal Virginia.

Geologists say that recharging the aquifer would help slow the sinking of our land – a problem known as subsidence. That would help make the region less vulnerable to rising seas.

The replenishment could allow Virginia to ease growing pressure on large groundwater users to reduce their withdrawals from the aquifer. And it could help development officials more aggressively market the region, whose economy has been struggling, to manufacturers or other employers with big water needs.

With HRSD's discharges into the Elizabeth, James and York rivers cut dramatically, Hampton Roads also would leap ahead in its progress toward a federal mandate to clean up the Chesapeake Bay. That could spare localities from having to invest hundreds of millions of dollars in stormwater management projects.

The HRSD project won't be cheap, easy or without controversy.

Its design and construction cost is estimated at \$1 billion over 15 years.

The agency will have to prove during extensive tests that the project is ready to go full-scale at the seven treatment plants being considered for it.

HRSD may run into pushback against its idea to charge groundwater users for aquifer withdrawals. In Virginia, that water is now free.

And then there's the "ick" factor.

"The thing that they're going to have to overcome and that's going to be the most difficult is public perception," said Robert Burnley, a former director of Virginia's Department of Environmental Quality.

Tens of thousands of homeowners in rural parts of coastal Virginia draw their drinking water directly from wells drilled into the aquifer that HRSD proposes to inject. Some towns, like Smithfield, depend on wells, too. Even some cities, like Portsmouth and Newport News, rely in part on groundwater.

"It's going to take a little selling to get people to accept that they'll essentially be drinking treated wastewater," Burnley said. "People don't want to think about drinking what they had been flushing."

He's sold, however: "That water is a very valuable resource, and a lot of money already goes into treating it. It just seems terrible to throw it all away."

One of the first things that Henifin stresses when he talks about HRSD's proposal, known officially as the "sustainable water recycling initiative," is that his agency isn't exactly going out on a limb.

Other U.S. communities already are reusing wastewater.

In Northern Virginia, the Upper Occoquan Service Authority has for 38 years been discharging water from its treatment plant into a reservoir. That same reservoir is tapped by another authority that further treats the water and sends it to Fairfax County residents.

Orange County, Calif., cleans wastewater to even higher standards and mixes it in underground basins with water imported from rivers. The blend is then piped to customers' homes.

At the far extreme is what's known as direct, or "pipe-to-pipe," reuse – with no reservoir or aquifer in between. What comes in as sewage goes back treated to drinking-water standards. Two drought-plagued Texas communities – Big Spring and Wichita Falls – use that method now.

The water needs are not so desperate to warrant that approach in coastal Virginia, Henifin said. A pipeline from Lake Gaston provides South Hampton Roads' municipal systems with an abundance of fresh water. Reservoirs collect a lot as well.

Plus, pipe-to-pipe reuse “doesn’t achieve all of the other environmental benefits” that aquifer replenishment would, he said.

When HRSD consultants produced computer models that showed recharging would pump up groundwater levels across a wide swath of coastal Virginia, he and others thought, “We’re on to something here,” Henifin said.

Geologists have for decades theorized that the main reason the land in Hampton Roads is sinking faster than in many other coastal areas is aquifer withdrawals.

To understand the theory, it first helps to know a little about aquifers. Basically, they’re layers of rock, sand or other sediment that are saturated with water. From countless rains and snowfalls, trillions and trillions of gallons have trickled into the sand beds of the Potomac aquifer, the deepest of several under coastal Virginia and the one into which HRSD proposes to inject. Water samples from deep in the aquifer have been estimated as old as 40,000 years.

State officials have calculated that roughly 150 million gallons a day are being drawn in Virginia from the aquifer, which stretches from New Jersey to the North Carolina-South Carolina line.

The heaviest withdrawals in Virginia are in West Point and Franklin, where paper mills have long operated. Combined, the plants take roughly 30 million gallons a day, and on U.S. Geological Survey maps of groundwater decreases, they stand out as red centers in a sea of blue.

Though most of the water is pulled from porous layers of sand and shell fragments, the aquifer system’s more dense clay layers are affected most because they compress much more easily as water pressure drops. That compaction is the biggest factor in subsidence across the southern Chesapeake Bay region, according to a Geological Survey report in 2013. It showed the land sinking at rates ranging from 1.1 to 4.8 millimeters a year over a seven-decade stretch ending in 2011.

When the subsidence is combined with rising ocean waters, the region’s relative sea-level rise has been adding up to an average of about 4 millimeters a year, the report said. Extended over a century, that works out to nearly 16 inches. Global warming could accelerate the pace, some scientists have warned.

All this puts Hampton Roads behind only one other U.S. coastal community, New Orleans, when it comes to waterfront investments at risk. No wonder the Navy and other big landowners in the region have been raising concerns.

How much HRSD’s proposal can help with the subsidence piece of the problem is unclear. For one thing, it’s planning to inject between 100 million and 120 million gallons a day into the aquifer – less than the current rate of withdrawals in Virginia.

While some surface water makes its way naturally into the aquifer, it may not be enough to close the gap. Plus, studies indicate that subsidence has a momentum that can continue long after the withdrawals that caused it end. And part of this region’s subsidence is attributed to the last ice age, which ended more than 10,000 years ago. The effects of those glacial movements likely will linger for millennia.

The best-case scenario for HRSD’s proposal may be to slow the sinking of the land, said Jack Eggleston, the lead author of the Geological Survey report. Still, he said, with subsidence accounting for more than half of the region’s relative sea-level rise, that could be a significant benefit.

Other benefits would be easier to measure.

If they can accept where the treated water came from, current groundwater users would see plenty of gains.

Many of them, including rural homeowners, face the prospects of having to deepen wells or drill new ones if groundwater levels continue to drop.

And the largest users – the roughly 175 that need state permits because they pull more than 300,000 gallons a month – have been told by state regulators in the past year to brace for reductions. Already, two of them – James City County and the WestRock Co. paper plant in West Point – face limits below the amounts they’re now taking. Government officials have said the

limitations could thwart residential development in some areas and are making it harder for industries to expand or locate in the region.

There's also concern that as the aquifer is drawn down, it's becoming more vulnerable to saltwater wedging in from the sea. That's happened in other coastal areas where groundwater was heavily tapped, ruining wells and forcing communities to turn elsewhere for fresh water.

The HRSD proposal promises to help lift many of those clouds, and Henifin said the agency believes it's only fair that groundwater users chip in. He wants to assess them fees to recover the \$20 million to \$40 million a year it would cost to operate and maintain the new equipment that would be required.

There's no provision under state law for charging groundwater users. And some are sure to object to changing that.

Still, Andrea Wortzel, a Richmond lawyer who coordinates a group of large users called Mission H2O, said they'd welcome an invitation to discuss how to perpetuate the groundwater supply: "Our members are very interested in looking for solutions."

Environmental groups also see the potential.

The HRSD proposal could cause "quite a dramatic improvement" in the water quality of rivers, said Marjorie Mayfield Jackson, executive director of the Elizabeth River Project. She said the cuts in surface discharges from HRSD treatment plants could strengthen the case for opening parts of the watershed, including sections of the Lafayette River in Norfolk, to oyster harvesting. Oyster populations have been rebounding, but the state Health Department bans their harvest throughout that watershed.

Taking away the river discharges would mean much less nitrogen and phosphorus going into the lower Chesapeake Bay. So localities facing expensive federal requirements to cut runoff of those pollutants might be able to gain a reprieve, said Whitney Katchmark, who oversees water resources issues for the Hampton Roads Planning District Commission.

With so much at stake, Henifin said, HRSD is going to great lengths to get things right.

Over the past several months, he and other staffers at the state-chartered agency have held briefings with scores of elected officials, regulators, planners, environmentalists and large water users. They've spent about \$400,000 on a study and computer modeling of the aquifer and gathered information on every wastewater-reuse and aquifer-injection system they could find.

They didn't have to go far, in some cases.

Chesapeake has put a net 2.8 billion gallons of fresh surface water into the Potomac aquifer since 1989. "We're essentially using it as a really large underground storage tank" that's tapped in times of extraordinary demand, said David Jurgens, the city's utilities director. This "aquifer storage and recovery" facility is the largest of its kind in the mid-Atlantic.

Jurgens said the only significant hiccups came early on, when the water that Chesapeake put in didn't closely enough match the water already in the aquifer at the injection site. That caused a chemical reaction that resulted in elevated levels of manganese in water being drawn back out. A pH adjustment in the injected water corrected that.

"Getting the chemistry right" in the water it injects will be crucial, Henifin said. Salt levels in the aquifer will vary, for example, depending upon how deep and where the injection wells are drilled. A mismatch between the water that goes in and the water already around the injection well could cause it to clog irreparably.

With as many as 10 injection wells per treatment plant, it could become an expensive problem to manage.

That's one of the reasons why HRSD is taking a "stair-step" approach, Henifin said.

The next significant step, beginning as early as May, will be "room-sized" pilot tests at its York County plant of the two processes the agency is considering adding to its treatment chain. One is

known as reverse osmosis. The other relies on activated carbon. Both processes will employ ultraviolet light in their cleansing arsenals.

"We'll run parallel processes to prove that they can reliably and effectively exceed drinking-water standards," Henifin said.

"I'll be drinking it," he insisted.

Assuming those tests go well, the next step would be the drilling in 2017 or 2018 of a single injection well, likely at the plant in northern Suffolk. As many as 3 million gallons a day of wastewater would then be treated to drinking-water standards and pumped deep into the ground.

If that demonstration succeeds and it gets the necessary state and federal OKs, the agency then would phase in either six or seven plants over about a decade ending in 2030.

The \$1 billion price tag that HRSD estimates for the entire project has raised eyebrows, Henifin conceded. But the agency already had forecast that toughening environmental standards would require it to spend \$4.4 billion for capital improvements over the next 20 years. So "it just takes a little creative rearranging of things to absorb a billion dollars and figure out the right place to put it."

Whether it goes forward with the project or not, Henifin said, HRSD's 460,000 ratepayers in 17 cities and counties will face higher bills. He predicts residential rates will go from an average of about \$30 a month to \$70 a month by 2030.

HRSD envisions the aquifer-replenishment project becoming its solution for the bay cleanup mandate, which requires it to sharply cut nitrogen and phosphorus discharges and which Henifin suspects could be toughened further. He said that if it moves forward with the proposal, HRSD likely will ask federal officials to push back deadlines for another expensive mandate – to eliminate occasional sewer overflows during periods of heavy rain. Correcting that problem will have a negligible environmental benefit, he said.

Persuading regulators to show some flexibility may be the easy part. Convincing everyday folks that the time has come for a radical solution to water problems could be much harder.

HRSD tentatively is planning meetings across the region in 2017 at which the public will be invited to comment on its proposal. Other comment periods likely will follow.

An outcry from groundwater users could get politicians' backs up and put HRSD's proposal in jeopardy.

Henifin is optimistic it won't come to that:

"The technology and the plan we've got is great. It would be just a shame to lose this opportunity to do the right thing."